



# Standard Test Methods for Chemical and Spectrochemical Analysis of Nuclear-Grade Silver-Indium-Cadmium Alloys<sup>1</sup>

This standard is issued under the fixed designation C760; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 These test methods cover procedures for the chemical and spectrochemical analysis of nuclear grade silver-indium-cadmium (Ag-In-Cd) alloys to determine compliance with specifications.

1.2 The analytical procedures appear in the following order:

|                                                                 | Sections |
|-----------------------------------------------------------------|----------|
| Silver, Indium, and Cadmium by a Titration Method               | 7 – 15   |
| Trace Impurities by Carrier-Distillation Spectrochemical Method | 16 – 22  |

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard and precautionary statements, see Section 5 and Practices E50.

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

C752 Specification for Nuclear-Grade Silver-Indium-Cadmium Alloy

D1193 Specification for Reagent Water

E50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials

E115 Practice for Photographic Processing in Optical Emission Spectrographic Analysis (Withdrawn 2002)<sup>3</sup>

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee C26 on Nuclear Fuel Cycle and are the direct responsibility of Subcommittee C26.03 on Neutron Absorber Materials Specifications.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

2.2 *Other Document:*

NBS Circular 602<sup>4</sup>

## 3. Significance and Use

3.1 Silver-indium-cadmium alloy is used as a control material in nuclear reactors. In order to be suitable for this purpose, the material must meet the specifications for assay and impurity content. These test methods are designed to show whether or not a given material meets the specifications as given in Specification C752.

3.1.1 An assay is performed to determine whether the material has the chemical composition specified.

3.1.2 The impurity content is determined to ensure that the maximum concentration limit of impurities is not exceeded.

## 4. Purity of Reagents

4.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society,<sup>5</sup> where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

4.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water conforming to Specification D1193.

## 5. Hazards

5.1 Proper precautions should be taken to prevent inhalation or ingestion of heavy element (silver, indium, or cadmium) powder or dust during handling.

5.2 Workers should observe precautions as specified in vendor-supplied Material Safety Data Sheets (MSDS).

<sup>4</sup> Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

<sup>5</sup> *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K. and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.